ARTICLE XXI
Wind Energy

165-162. Purpose.

In order to balance the need for clean, renewable energy resources and the necessity to protect the public health, safety and welfare of the community, the county finds these regulations are necessary to ensure that wind energy conversion systems are appropriately designed and safely sited and installed.

§ 165-163. Definitions.

ABANDONED WIND ENERGY FACILITY – A wind energy facility shall be considered abandoned when the facility fails to operate for more than one year without the written consent of the zoning administrator.

ANEMOMETER – A device that measures the wind speed and transmits wind speed data to the controller.

ELIGIBLE CUSTOMER-GENERATOR – A customer that owns and operates, or contracts with other persons to own, operate, or both, an electrical generating facility that (i) has a capacity of not more than 10 kilowatts for residential customers and 500 kilowatts for nonresidential customers unless a utility elects a higher capacity limit for such a facility; (ii) uses as its total source of fuel renewable energy, as defined in Virginia Code §56-576; (iii) is located on the customer's premises and is connected to the customer's wiring on the customer's side of its interconnection with the distributor; (iv) is interconnected and operated in parallel with an electric company's transmission and distribution facilities; and (v) is intended primarily to offset all or part of the customer's own electricity requirements.

FALL ZONE – The area, defined as the furthest distance from the tower base, in which a tower will collapse in the event of a structural failure.

HYBRID SYSTEM – An energy system that uses more than one technology to produce energy or work.

KILOWATT (kW) – The kilowatt is equal to one thousand watts.

MEGAWATT (MW) – The megawatt is equal to one million watts.

MICRO WIND SYSTEM – A building-mounted micro wind system that has a manufacturer's rating of 10 kilowatt (kW) or less and projects to more than fifteen (15) feet above the highest point of the roof.

NET ENERGY METERING – Measuring the difference, over the net metering period, between (i) electricity supplied to an eligible customer-generator, as defined by Virginia

Code §56-594 B, from the electric grid and (ii) the electricity generated and fed back to the electric grid by the eligible customer-generator.

NET METERING PERIOD – The 12-month period following the date of final interconnection of the eligible customer-generator's system with an electric service provider, and each 12-month period thereafter.

RATED NAMEPLATE CAPACITY – The maximum rated output of electric power production equipment. This output is typically specified by the manufacturer with a "nameplate" on the equipment.

ROTOR DIAMETER – The diameter of the circle described by the moving rotor blades.

SUBSTATIONS – Any electrical system designed to convert electricity produced by wind turbines to a voltage greater than 35 kilovolts (kV) for interconnection with high voltage transmission lines.

TOWER – With regard to a wind energy conversion system, the structure on which the wind energy conversion system is mounted.

TOWER HEIGHT – With regard to a wind energy conversion system, the height above grade of the fixed portion of the tower, excluding the wind turbine itself.

TRANSMISSION LINE – Those electrical power lines that carry voltages of at least 69 kilovolts (kV), and are primarily used to carry electric energy from place to place, rather than directly interconnecting and supplying electric energy to retail customers.

SHADOW/FLICKER – The visible flicker effect that occurs when rotating turbine blades cast shadows on the ground and nearby structures causing the repeating pattern of light and shadow.

WATT - A derived unit of power in the International System of Units. It measures rate of energy conversion. One watt is equivalent to 1 joule (J) of energy per second.

WIND ENERGY CONVERSION SYSTEM – An apparatus for converting the kinetic energy available in the wind to mechanical energy that can be used to power machinery (grain mills, water pumps, et cetera) and/or to operate an electrical generator.

WIND ENERGY FACILITY – An electric generating facility, the main purpose of which is to supply electricity, consisting of one or more wind turbines and other accessory structures and buildings, including substations, meteorological towers, electrical infrastructure, transmission lines and other appurtenant structures and facilities.

WIND ENERGY FACILITY, COMMERCIAL SCALE SYSTEM – See "Wind Energy Facility, Large System".

WIND ENERGY FACILITY, COMMUNITY SCALE SYSTEM – See "Wind Energy Facility, Large System".

WIND ENERGY FACILITY, LARGE SYSTEM – A wind energy conversion system consisting of one or more wind turbines, towers, and associated control or conversion electronics, having a rated name plate capacity of not more than 999 kilowatts (kW). For the purpose of net metering, Virginia Code §56-594B limits the electrical generating facility to a capacity of not more than 500 kilowatts (kW).

WIND ENERGY FACILITY, ON-SITE – A wind energy conversion system that will generate electricity on-site primarily for use on-site and/or through net metering.

WIND ENERGY FACILITY, SMALL SYSTEM – A small wind energy conversion system consisting of a single wind turbine, a tower, and associated control or conversion electronics, having a rated name plate capacity of not more than 25 kilowatts (kW). For the purpose of residential net metering, Virginia Code §56-594B limits the electrical generating facility to a capacity of not more than 10 kilowatts (kW).

WIND ENERGY FACILITY, UTILITY SCALE – A wind energy conversion system consisting of more than one wind turbine, tower, and associated control or conversion electronics, having a rated name plate capacity of 1 megawatt (MW) or greater.

WIND FARM – See "Wind Energy Facility, Utility Scale".

WIND MONITORING OR METEOROLOGICAL TOWER – A tower equipped with devices to measure wind speeds and direction, used to determine how much wind power a site can expect to generate.

WIND POWER – Power that is generated in the form of electricity by converting the rotation of turbine blades into electrical current by means of an electrical generator.

WIND PUMP – A type of windmill used for pumping water from a well or draining land.

WIND TURBINE – A wind energy conversion device that produces electricity; it typically has one, two or three blades and may include a nacelle, rotor, generator, controller, and tower among other components.

WIND TURBINE HEIGHT – The distance measured from grade to the highest point of the turbine rotor or tip of the turbine blade when it reaches its highest elevation.

WINDMILL – A machine designed to convert the energy of the wind into more useful forms using rotating blades to turn mechanical machinery to do physical work, such as crushing grain or pumping water.

§ 165-164. Uses permitted by right and by special use permit.

A. Micro wind system as defined in the definitions section of this article is a permitted use in all zoning classifications where structures of any sort are allowed.

B. Small scale wind energy facilities up to 120' blade height shall be a permitted use in all zoning classifications where structures of any sort are allowed. Small wind energy systems above 120' blade height shall be permitted by special use permit. Temporary meteorological towers with measurement devices for the purpose of investigating wind power shall be allowed with a zoning permit. See § 165-163. Wind Monitoring or Meteorological Tower.

C. Large scale wind energy facilities shall be permitted by special use permit in all zoning classifications where structures of any sort are allowed, except that temporary meteorological towers with measurement devices for the purpose of investigating wind power shall be allowed with a zoning permit. See § 165-163. Wind Monitoring or Meteorological Tower.

D. Utility scale wind energy facilities shall be permitted by special use permit in all zoning classifications where structures of any sort are allowed, except in the Low-Density Residential (R-1), Medium-Density Residential (R-2) and the High-Density Residential (R-3) zoned areas. Temporary meteorological towers with measurement devices for the purpose of investigating wind power shall be allowed with a zoning permit. See § 165-163. Wind Monitoring or Meteorological Tower.

E. Site plan review and approval as provided in Article XIV is required for Large and Utility Scale wind energy facilities showing the planned location of each wind turbine and tower, property lines, setback lines, access road and turnout locations, substations, electrical cabling from the wind energy facility to the substations, ancillary equipment, buildings, structures, including permanent meteorological towers, associated transmission lines, and location of all structures and properties within the geographical boundaries of any applicable setback. Additional information may be required, such as a scaled elevation view and other supporting drawings, photographs of the proposed site, simulations of the site as it will appear once the proposed facilities are constructed, detailed landscaping and screening plan, coverage map, and additional information that may be needed for a technical review of the proposal.

§ 165-165. Wind Monitoring or Meteorological Tower.

A meteorological tower with anemometer and other measurement devices may be installed with the issuance of a zoning permit for the purpose of monitoring wind and other environmental conditions relevant to siting wind energy conversion systems, used to determined how much wind power a site can be expected to generate. The zoning permit is valid for a period of one year and is renewable. The meteorological tower must be setback from all property lines a distance equal to one linear foot for every foot of height. The tower may be allowed in all zoning districts that wind energy conversion

systems are allowed. Except that permanent wind monitoring or meteorological towers that are part of an approved site plan shall be exempt from this requirement.

§ 165-166. Evidence of electric utility notification.

The applicant shall provide evidence that the provider of electric utility service to the site has been informed of the applicant's intent to install a net energy metered wind energy conversion system. This notification will take place by having the electric utility provider sign a letter stating it has been notified. Applications stating that the proposed wind energy conversion system will not be net energy metered shall be exempt from this requirement.

§ 165-167. General provisions.

A. Lighting. Wind turbines shall be lighted only if required by the Federal Aviation Administration. Lighting of other parts of the wind facility, such as appurtenant structures, shall be limited to that required for safety and operational purposes, and shall be full-cutoff luminaries.

B. Signs. No signs, lettering, symbols, images or trademarks shall be placed on or affixed to any part of a wind energy conversion system, other than as required by law and excepting those necessary to identify the owner, provide a 24-hour emergency contact phone number, and warn of any danger. Educational signs providing information about the facility and the benefits of renewable energy may be allowed and must be in compliance with the sign ordinance.

C. Visual appearance of the tower. Wind energy towers shall maintain a galvanized steel finish, unless FAA standards require otherwise, or if the owner is attempting to make the tower conform to the surrounding environment and architecture it may be painted to reduce visual obtrusiveness to the satisfaction of the Zoning Administrator. Monopole towers are the preferred type of support for the wind facilities.

D. Sound levels. Wind energy conversion systems shall not exceed 60 decibels, as measured at the closest property line. The level, however, may be exceeded during short-term events such as utility outages and/or severe windstorms.

E. Evidence of height. The applicant shall provide evidence that the proposed height of the wind energy conversion system tower does not exceed the height recommended by the manufacturer or distributor of the system.

F. Electromagnetic communication interference. The applicant shall minimize or mitigate any interference with electromagnetic communications, such as radio, telephone or television signals caused by any wind energy conversion facility.

G. Utility connections. Reasonable efforts shall be made to locate utility connections from a wind energy conversion system underground, depending on appropriate soil conditions, shape, and topography of the site and any requirements of the utility provider.

Electrical transformers for utility interconnections may be above ground if required by the utility provider.

H. Shadow/Flicker. Large and utility scale wind energy conversions systems shall be sited in a manner that minimizes shadowing or flicker impacts. The applicant has the burden of proving that this effect does not have significant adverse impact on neighboring or adjacent uses through the appropriate siting of the facility or mitigation.

I. Automatic overspeed controls. All wind energy conversion systems shall be equipped with manual (electronic or mechanical) and automatic overspeed controls to limit the blade rotation speed to within the design limits of the wind energy conversion system.

J. Land clearing, soil erosion and habitat impacts. Clearing of natural vegetation shall be limited to that which is necessary for the construction, operation and maintenance of the wind facility. Adherence to Erosion and Sediment Control regulations is required. The restoration of natural vegetation in areas denuded for construction activities shall be required so long as the restored vegetation does not interfere with the operation of the wind energy conversion system or the maintenance thereof.

K. Facility conditions. The maintenance of the wind energy conversion system facility, all appurtenant structures, and any required access facility is the responsibility of the property owner.

§ 165-168. Dimensional Requirements.

A. The following dimensional requirements shall apply to the installation of wind energy conversion systems:

Type of Wind Energy Facility		**Small Scale**	**Large Scale**	**Utility Scale**
Minimum Lot Size (in acres)		0.46 (20,000 sq ft)	5	25
Minimum Setback Requirements [1] (times tower height)	From occupiable building located on same parcel [2]	0	1	1.5
	From occupiable building located on adjacent parcel [2,3]	1.5	2	2.5
	From property lines [2]	1	1	1.5
	From public or private right-of-way [2]	1.5	1.5	1.5
Maximum height from ground, including blades (in feet)		120	250	500
Minimum distance between blades and ground (in feet)		20		
Minimum distance between blades and highest point of any structure within 150 feet (in feet)		10		

1. Measured from the center of the wind turbine tower base to the property line, right of way, or nearest point on the foundation of an occupied building.
2. Calculated by multiplying the required setback number by the wind turbine height.
3. This setback proposes to reduce noise and shadow flicker impacts to any previously existing occupied buildings on adjacent properties.

B. As part of the Special Use Permit or Zoning Permit approval process, setback provisions may be waived if the following conditions are met:

(1) Setbacks may be reduced by notarized consent of the owner of the property on which the requested wind energy conversion system is to be erected and the adjacent landowner whose property line or dwelling falls within the specified distance.

§ 165-169. Federal and State Requirements

A. Compliance with the Virginia Uniform Statewide Building code. Building permit applications for wind energy conversion systems shall be accompanied by standard drawings of the wind turbine, including the tower, base and footings. An engineering analysis of the tower showing compliance with the Virginia Uniform Statewide Building code and certified by a Virginia licensed professional engineer shall also be submitted. This analysis is frequently supplied by the manufacturer. Wet stamps shall be required.

B. Compliance with FAA Regulations. Wind energy conversion systems must comply with applicable FAA regulations, including any necessary approvals for installations close to airports.

C. Compliance with National Electric Code. Building permit applications for wind energy conversion systems shall be accompanied by a line drawing of the electrical components in sufficient detail to allow for a determination that the manner of the installation conforms to the National Electrical Code. This information is frequently supplied by the manufacturer.

D. Compliance with regulations governing net energy metering. Wind energy conversion systems connected to the utility grid must comply with the Virginia Administrative Code 20VAC5-315, Regulations Governing Net Energy Metering.

E. An Environmental Impact Study (EIS) for Large and Utility Scale Wind Energy Facilities, which shall include review and comments from applicable state and federal agencies.

F. Other relevant studies, reports, certifications and approvals as may be reasonable requested by the County to ensure compliance with this ordinance.

§ 165-170. Decommissioning or Abandonment

A. Any wind facility which has reached the end of its useful life or has been abandoned shall be physically removed no more than 150 days after the date of discontinued operations. Notification to the County of the proposed decommissioning is required.

B. Decommissioning shall include removal of wind turbines, tower, buildings (unless such buildings are to be retrofitted for another purpose), cabling, electrical components,

roads (unless such roads need to remain to access buildings retrofitted for another purpose), and any other associated facilities.

C. Stabilization or re-vegetation of the site as necessary to minimize erosion. Landscaping or designated below-grade foundations may be allowed to remain in order to minimize erosion and disruption.